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ANNUAL REPORT

ON THE

MEDICAL RESEARCH INSTITUTE

FOR THE YEAR

1922.

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Annual Report on the Medical Research Institute for the year 1922.

MEDICAL RESEARCH INSTITUTE,
YABA, NEAR LAGOS,
NIGERIA,
20th March, 1923.

SIR,

I have the honour to present the Annual Report of the Medical Research Institute for the year 1922.

2. The outstanding feature of the period under review was the re-establishment of a clinical laboratory attached to the Colonial Hospital in Lagos. Dr. W. A. Young was placed in charge, and was given the assistance of a native attendant. Dr. Young's report, which is appended, shows that a large amount of work has been done, which has been of great benefit both to the Hospital and to the Institute.

3. Special attention has been devoted to cases of Calabar Swelling, and a synopsis of the main signs and symptoms is given.

4. Two cases of intestinal infection with Isospora hominis are reported. This disease has not previously been observed in Nigeria.

5. The usual analysis of cases of Black-water Fever is given. As in former years, there have been marked differences in individual cases of the disease, and on the other hand a very constant malarial history.

6. Dr. A. Connal, the Director, was invalided home on 1st April, and resumed duty on 14th December.

Dr. W. A. Young, Assistant Bacteriologist, was on duty throughout the year, as was also Mr. E. F. Hines, the Laboratory Attendant.

Mr. G. A. Sawyerr, the native Laboratory Assistant, was on duty in the Lagos Laboratory.

Second-class Clerk Mr. E. Craig replaced Second-class Clerk Mr. E. B. Onimole on 18th April.

Future requirements include the appointment of a Deputy Director and of a Protozoologist; a new building to house the Museum and Library, and to include a Clerk's office; and the supply of electricity for lighting and other purposes.

The last two requirements are not new. They are as old as the Institute.

I have the honour to be,
Sir,
Your obedient Servant,
A. CONNAL,
Director, Medical Research Institute.

The Director,
Medical and Sanitary Service,
Lagos.

CALABAR SWELLINGS.

Data regarding Calabar Swellings have been obtained from 100 sufferers from this condition. The number is made up of thirty cases in Europeans and seventy in native Africans.

EUROPEAN CASES.

The European cases occurred in adults, twenty-seven of whom were male and three female.

All contracted their infection in Nigeria or in British Cameroons, the Nigeria cases coming mainly from the Sapele and Calabar districts.

The length of time which elapsed between the first exposure to infection and the first appearance of signs of the disease, has not been easy to determine, for the reason that the distribution of Chrysops is not completely ascertained. It is significant, however, that in sixteen cases, one or more signs of the disease appeared within one year of residence in an infected area.

Only one of these cases affords unimpeachable evidence.

He had never previously been out of England, he had proceeded directly to a notoriously infected district and the first swellings appeared six months after his arrival.

The four signs of infection with Filaria (Loa) loa, in order of their frequency in the series of thirty European cases are (1) swellings, (2) visits of the worm to the eye, (3) the outline of the worm beneath the skin, and (4) embryos in the peripheral blood.

Swellings had occurred in all the cases, with one exception. In six individuals, swellings were the only sign of infection.

Eighteen patients suffered from the visits of the worm to the eye. In no case, however, were these the only sign of the infection.

The outline of the worm had been seen beneath the skin in sixteen cases.

Embryos of Filaria (Loa) loa were demonstrated in the blood of eleven cases.

Six cases showed all four signs of the infection.

The actual conditions obtaining in the thirty European cases are tabulated below.

TABLE I.

Signs.	Cases.
Swellings	29
Swellings and eye condition	18
Swellings and skin condition	15
Swellings and embryos	10
Swellings, eye condition and skin condition	11
Swellings, eye condition and embryos	8
Swellings, skin condition and embryos	7
Swellings, eye condition, skin condition and embryos	6
Swellings only	6
Swellings and eye condition only ...	5
Swellings, eye condition and skin condition only	5
Swellings and skin condition only ...	3
Swellings, eye condition and embryos only	2
Swellings, skin condition and embryos only	1
Swellings and embryos only	1
Skin condition and embryos only ...	1

The usual sites of the swellings have been given by all the patients, although one merely states that they arise "anywhere." There were two or more sites in all save one, in which last case the only situation of the swellings was over the right wrist. The total number of sites given is twenty-three and these are noted in Table II in the order of their frequency.

TABLE II.

SITE OF SWELLINGS.	CASES.
Hand (Palm or dorsum, fingers) ...	18
Forearm ...	15
Wrist ...	14
Arm ...	5
Upper arm ...	3
Shoulder ...	3
Elbow ...	2
Total in upper limb ...	60
Leg ...	5
Foot ...	4
Thigh ...	4
Knee ...	3
Calf ...	2
Ankle ...	2
Sole ...	1
Total in lower limb ...	21
Scrotum ...	3
Abdomen ...	2
Back ...	2
Chest ...	2
Loin ...	1
Total in trunk ...	10
Forehead ...	2
Face ...	2
Eyelid ...	1
Malar region ...	1
Total in head ...	6

The commonest sites number ten as will be seen from Table III.

TABLE III.

Forearm ...	11	Foot ...	3
Wrist ...	10	Ankle ...	2
Hand ...	9	Leg ...	1
Arm ...	3	Back ...	1
Elbow ...	2	Forehead	1

The swellings arose on either or both sides in twenty-one cases, on the left side only in six and on the right side only in two.

The usual time of commencement was during the night in ten, during the day in nine, either day or night in eight and not noted in two.

The swellings were multiple, that is, arose simultaneously in nine, the situations being the forearm (two cases); the wrists and forehead; the foot, wrist and hand; the hand and foot; both wrists; both hands; the wrist and foot; and the arms, legs, face and abdomen.

Swellings arose in sequence, that is, the first was subsiding when another commenced in eleven cases. These sequences were as in Table IV.

TABLE IV.

SEQUENCE.	CASES.
Wrist to forearm	3
Forearm to opposite wrist or forearm	1
Right arm to left leg	1
Left forearm, hand, to fingers	1
Palm to shoulder	1
Upper arm, elbow to wrist	1
Arm to leg	1
Left forearm to right thigh	1
Upper arm to forearm and *vice versa*	1

The sensation in the swelling is described as tightness, stiffness or numbness in seventeen cases, as a dull ache in six, as an itch, tickling or irritation suggestive of an insect-bite in six, as actual pain in five, twinges in two and tenderness in one. Four individuals mentioned that there was an impression as of a worm moving.

Various inducements tending to bring on swellings have been observed, although twenty-three patients have not noticed this. Tennis is given as an excitant in two, as is also motor-cycling, in which cases the swellings were induced in the arms. Rubbing, a knock or a blow, the taking of alcohol or beer, or an Iron and Arsenic tonic, and damp weather are the other circumstances incriminated.

The duration of a swelling varies from a few hours to ten days in the early phases of the illness, from a day or so to a week in the middle period and from two or three days to a week or two in the later stages.

The interval of freedom from swellings tends to be short in the earlier stages; it may be weeks or months in the intermediate period and months towards the end of the infection.

Generally speaking, the data indicate that the number of sites increases with the duration of the illness, and multiplicity of swellings tends to be greater in the middle period.

In the first year or two the intervals of freedom are short and in some cases the swellings were practically continuous. Later, these intervals lengthen but the actual "bouts" of swellings may be more severe. Finally the interval of freedom may extend to several months, the swellings at the same time becoming fewer and less persistent.

Two patients noted that their swellings were more severe whilst at home on leave, and one patient noted that they were worst while in Nigeria.

Data regarding the total length of the infection are afforded by eight cases. Six of the patients are almost certainly now free and the remaining two are very probably so. The following are the details.

Case No. 9. Swellings ceased after three years. No other manifest signs. No signs for five years.

Case No. 13. Swellings ceased after five years. No other manifest signs. No signs for eight years.

Case No. 20. Swellings and appearance of worm in eye ceased after ten years. No signs for over one year.

Case No. 21. Swellings and appearance of worm in the eye and beneath skin ceased after ten years. No signs for three years.

Case No. 25. Swellings ceased after twelve years. Worm appeared in eye only once, seven years ago. No signs for three years.

Case No. 28. Swellings ceased after ten years. Appearance of worm in eye and under skin ceased after twelve years. No signs for three years.

The other two cases are:—

Case No. 27. Swellings, which became unusually numerous during a period of fifteen years, have been absent for sixteen months, but worm visited the eye four months ago.

Case No. 29. Swellings ceased after eight years and have been absent for a similar period. Worm made its appearance in the eye six months ago, having paid periodic visits for sixteen years.

The two shortest infections, therefore, are of three and five years respectively and the two longest are of fifteen and sixteen years.

In the latter two cases, re-infection cannot be excluded but there is nothing in the history of either to indicate this occurrence.

Eighteen patients suffered from the visits of the worm to the eye. The onset of this condition coincided with the onset of swellings in five cases. In the others, the swellings preceded the eye phenomena by six months in one case, a year in four cases, two years in two cases, three years in four cases, five years in one, and eight years in the last. It is therefore evident that in seven cases the worm may yet appear in the eye. Indeed, in Case No. 1, information has just been received that the eye has been visited twice since the original history was taken.

As will be seen from Table V, the number of visits to the eye is not definitely related to the duration of the infection. But where the visits have been many, the swellings have been numerous, so that it is probable that a heavy infection is thus indicated.

TABLE V.

DURATION.	1 week.	11 months.	3 years.	3½ years.	4 years.	5 years (3 cases).	5½ years.	7 years (2)	8 years (2)	9 years.	10 years.	12 years.	15 years.	16 years.
VISITS.	one.	one.	many.	one.	two.	three. many (2)	several.	three. many.	one. many.	two.	several.	many.	many.	many.

The duration of each visit is, as a rule, only a few minutes, but in several cases the patients stated that the worm "hangs about," and that it can be felt although not seen. In one case it "came and went" continuously for two days. The worm remains longer in the eye during the night than during the day.

The intervals of freedom are much longer than those between the swellings. In only two cases were the visits as frequent as once a week and in the others the periods vary from one to fifteen months.

The eye usually affected was the right in ten, the left in six and either eye in two.

The worm commonly came during the day in twelve, during the night in four, and either day or night in two.

The sensation in the eye at the time of the visit is stated by most to be one of irritation, as if there were grit in the eye. One patient obtained relief by holding up the upper eyelid. In most cases a certain amount of interference with vision occurred, with tumefaction, injection of the conjunctivae, and lachrymation.

One of the patients, a medical man of long experience in Nigeria, advises his patients to lie down in a darkened room whilst the worm is in the eye. He is then more likely to reach his patients in time to extract the worm.

In two cases a worm has been present in each eye at the same time.

In seven cases a worm has migrated from one eye to the other, the route followed being across the bridge of the nose in five and by a deeper path, the nature of which is not indicated, in two cases.

Seven patients, also, have had a worm or worms extracted, the largest number in any one case being five. In one instance two were extracted from the eye, together.

The outline of the worm beneath the skin has been observed in sixteen cases. In one of these, Case No. 30, there had never been any swellings and the worm had not appeared in the eye ; the flexor surface of the forearm was the part affected, and two worms had been extracted therefrom. Apart from this case, swellings occurred in all, and the worm also visited the eye in eleven. In seven, embryos were present in the blood. The earliest record of the outline of the worm having been seen is in a case of one year's illness.

The eyelid is the region most commonly affected, this occurring in six, usually when the worm was visiting the eye. It was noted under the skin over the bridge of the nose, in similar circumstances in five cases. The other areas were the forearm (three cases), the palm, the wrist, the shoulder and the ankle, each in two cases, and the thumb-nail, knuckle, penis, chest, back, scalp and temple each in one case.

In case No. 29 a worm was removed from the knuckle and another from the shoulder.

In describing the sensation while the worm moves, five patients use the expression " pricking." Four others experienced an "irritation," and two felt pain whilst it migrated beneath the scalp or over the bridge of the nose. In the other cases the worm was " felt moving."

It was noted, as regards the swellings (Table II) that they mostly occurred in the upper limb. The outline of the worm on the other hand was most commonly seen in the head (thirteen cases). The upper limb was next commonest (eleven cases), the trunk was affected in three and the lower limb in one.

Embryos of Filaria (Loa) loa were found in the peripheral blood in eleven cases. Figures relating to this sign of the infection are, however, of small value in the present series of cases, because in most instances the blood was examined only once and from two patients no specimen of blood was received.

The earliest case in which embryos were found was in one of one year's standing (Case No. 30) and the next was in one of three years' duration. In sixteen cases where the infection had been present from three to eleven years embryos were found in nine, and as will be seen from Table I they were more commonly found where the other three criteria, swellings, eye affection and skin affection, were present. The figures are summarised in Table VI.

TABLE VI.

Signs.	Cases.	Embryos.	Percentage.
Swellings and eye condition ...	18	8	44·4
Swelling and skin condition ...	15	7	46·6
Swellings, eye and skin condition	11	6	54·4

An inquiry as to the occurrence of any other signs or symptoms thought to be due to the presence of the filaria elicited negative replies except in one case, where deep abscesses in the leg were ascribed to this cause.

Table VII contains most of the data detailed above.

SUMMARY.

Swellings occur in practically any situation, but mostly in the upper limbs. They increase in number and usually also in severity for several years, after which they decrease and the interval of freedom lengthens. Exceptionally, they cease in three to five years, more usually they persist for eight to twelve years. The usual sensation is one of numbness, seldom of pain.

The visits of the worm to the eye may begin with the first swellings, but they are usually of later origin and they may persist after the swellings have ceased.

The migrations of the worm under the skin are also of later origin than the swellings. They are noted most frequently in the head.

Embryos are not usually found in the blood until the infection is of some years' duration.

The probability is that individual differences between the cases are accounted for by the age, and the degree of the infection. The number of larvae which gain entrance from the fly to the human host, the number which attain to maturity in the body, the numerical relationship of adult males to females and the absence of one or other sex, have in all likelihood a considerable bearing on the nature and extent of the resulting clinical signs.

These clinical signs are swellings, the appearance of the worm in the eye, the outline of the worm beneath the skin, and the presence of embryos in the blood, during the day time. These criteria are in their order of frequency, and of onset.

Two cases of short total duration, three and five years respectively, are recorded.

A case of eighteen months' duration is included, in which all the signs, except the presence of embryos in the blood, occurred.

An exceptional case of one year's duration is described, in which there had never been any swellings nor had the worm appeared in the eye.

Two cases are noted in which swellings had recurred at intervals for over twelve years.

The diagnosis in twenty-four of the thirty cases has been verified by the appearance of the worm in the eye, its outline beneath the skin or its embryos in the blood. Of the six unverified cases, one has been removed from this category lately (Case No. 1 already referred to) and other three were in an early stage of the infection at the time of reporting, so that with the lapse of time confirmation may be forthcoming. The remaining two cases were of short duration and the blood was not examined, whilst the only other signs of infection—swellings—were present.

TABLE VII.

No. of Cases.	Residence.	Illness.	Sites of Swellings (commonest Italics.)	Multiple Swellings.	Swellings in sequence.	Swellings arise.	Duration of Swellings.	Interval of freedom.	Sensation in Swellings.	Progress.	Embryos.	Swellings and worm in eye at same time.	First appearance of worm in eye.	Number of visits.	Duration of visits.	Interval of freedom.	Time of visits.	Worm under skin.
1	4/12	5/12	Hands, *wrists*, *forearms*, shoulder.	No	Forearm, opposite wrist.	Night.	6 hrs.–10 dys.	2–14 dys.	Heat, Stiffness, Irritation.	Consistent.	No	—	—	—	—	—	—	—
2	17/12	10/12	*Left leg*, Right arm.	No	Right arm, left leg.	Either.	½–3 dys.	10–12 dys.	Dragging ache.	Less.	No	—	—	—	—	—	—	—
3	8/12	11/12	*Wrists*, *forehead*.	Wrists, forehead.	No	Night.	A few hours.	2–3 dys.	Tightness.	Consistent.	No	—	—	—	—	—	—	—
4	6/12	12/12	Right *foot*, Right *wrist*, Left *hand*	Foot, wrist, hand.	No	Either.	never free.	Never free.	Stiffness.	More.	No	Right hand.	1/52	One.	Few mins.	—	Day.	Ankle, eyelid.
5	9/12	18/12	*Right wrist*.	No	No	Day.	few hrs.–1 wk.	1–3 mths.	No	Consistent.	No	—	—	—	—	—	—	—
6	9/12	2	*Left arm*, Left hand.	No	Forearm, hand, fingers.	?	10–30 dys.	1 wk.–2 mths.	Dull heavy pain.	Consistent.	No	Arm.	11/12	One.	Few mins.–3 dys.	—	Day	—
7	2½	2	*Ankle*, *Upper arm*, wrist, abdomen, scrotum, palm, shoulder.	No	Palm to upper arm.	Day.	few hrs.–2 dys.	Dys.–mths.	Numbness, sometimes pain.	Longer intervals, severer bouts.	No	—	—	—	—	—	—	Palm, ankle.
8	4	3	*Hands*, *forearms*.	No	No	Either.	1–2 dys.	1–3mths.	Stiffness.	Consistent.	Yes.	—	—	—	—	—	—	Forearm.
9	3/12	3	*Left hand*, Left forearm.	No	No	Night.	1–10 dys.	Wks.–mths.	Tightness, Numbness.	None for 5 yrs.	No	—	—	—	—	—	—	—
10	6	3½	Left hand, *Left foot*.	Hand and foot.	No	Night.	1–10 dys.	Wks.–mths.	Tickling, Tingling, Numbness, Twinges.	More.	not exm'd.	Left hand.	3½	One.	Few mins.	—	Night	—
11	4	4	*Wrists*, palms.	Both wrists.	No	Night.	few hrs.–2 dys.	1–2 wks., now every 3 wks.	Stiffness.	Less.	Yes.	Wrists.	3	Many.	Few mins.–3 hrs.	2–10 mths.	Night.	Eyelids, palms.
12	12/12	5	Forearm, *wrists*.	No	No	Day.	6–12 hrs.	1–3 mths.	Stiffness, Tension, Tenderness.	Consistent.	Yes.	—	5	Many.	10 mins.–2 hrs.	3–15 mths	Day	—
13	15/12	5	*Hands*, Upper arm, knees.	Both hands.	No	Night.	almost constant, then some wks.	dys, now wks.	Numbness.	None for 8 yrs.	No	—	—	—	—	—	—	—
14	5/12	6	*Left arm*, hands, legs, thigh, foot.	No	No	Day.	1½–5 dys.	1–2 mths.	Pricking.	Less.	Yes.	Arm.	5½	Several.	10–15 mins.	Many mths.	Day	Temples, shoulder.
15	6/12	6	Palm, *wrist*, *elbow*, Upper arm, sole, calf, thigh, loins, chest, forehead.	Wrist and foot.	Upper arm, elbow, wrist.	Night.	few hrs.–1 wk.	Dys.–wks.	Tightness.	Less, but more often multiple.	No	Wrists.	5	Many.	Few mins.–2 hrs.	Wks.–mths.	Night	Eyelid, chest, nose.
16	2	7	*Hands*, face, *arms*, legs.	Arms. Hands.	No	Day.	12 hrs.–1 wk.	Dys.–mths.	Tightness.	Less.	Yes, 3 yrs. ago.	—	5	Three.	About 1 hr.	Mth.–yr.	Day	Under thumb nail.
17	12/12	7	*Forearms*, *hands*.	Forearms.	Wrist, forearm.	Night.	1½–5 dys.	Wks.–mths.	Tightness, Drawing together.	Less.	No	—	—	—	—	—	—	Wrist.
18	6/12	9	Hands, *wrists*, forearms knees, thighs.	No	No	Either.	½–3 dys.	2 wks.–4 mths.	Painful.	Less frequent more severe and lasting.	No	—	—	—	—	—	—	Wrists.
19	12/12	9	*Forearm*, leg, eyelid, malar region.	No	Arm, leg.	Either.	few hrs.–2 dys.	Wks.–mths.	Dull ache.	Less.	Yes.	—	7	Many.	Less than 1 hr.	Dys.–mths.	Either	Nose, eyelids.
20	9/12	10	*Left forearm*, Right wrist.	No	No	Day.	few hrs.	Weeks.	Dull faint ache.	None for 1 yr.	No	—	10	Several.	About 2 hrs.	1 wk.–3 mths. none for 1 yr.	Day	—
21	3	10	*Anywhere*.	Anywhere.	Anywhere.	Day.	3–7 dys.	Seldom free, 3 yrs., then wks.–mths.	Effect of insect bite.	None for 3 yrs.	Yes, 3 yrs. ago.	Anywhere.	7	Three.	3 hrs.–3 dys.	4 yrs.–6 mths., none for 3 yrs.	Day	Yes.
22	2¼	11	*Wrists*, forearms, popliteal space.	No	Wrist, forearm.	Day.	1–2 dys.	About 3 mths.	Tightness, Stiffness, Dull pain.	Less.	Yes.	—	—	—	—	—	—	—
23	10	11	*Forearms*, wrists.	No	Wrist, forearm.	Either.	2 dys.	Dys.–wks.	Tightness.	Less.	Yes.	—	8	Many.	Few mins.	At first 1 per wk., now 2–3 wks.	Either	—
24	6/12	12	Hands, *forearms*, thighs.	No	Left forearm, right wrist.	Day.	2–3 wks. now 2–3 dys.	Wks.–mths.	Tightness, Slight ache.	Less.	Yes, 2 yrs. ago.	Wrist.	4	Two.	15 mins.	Feb. and May, 3 yrs. ago.	Day	Eyelid.
25	13	12	*Right hand*, forearm, *elbow*, scrotum.	No	No	Night.	1–7 dys.	At first dys., then wks.–mths.	Tingling, Tickling, Twinges.	None for 3 yrs.	not exm'd.	—	9	Two.	Few hrs.	2 yrs. between, none for 7 yrs.	Night	—
26	10/12	13	*Left hand*, *forearm*, chest, Right calf.	No	No	Night.	3 dys.–2 wks.	3 wks.–6 mths.	Irritation like insect bite.	Less.	No	—	8	One.	2 hrs.	—	Day	—
27	12/12	15	*Hands*, *wrists*, *forearms*, *feet*, *ankles*, scrotum, abdomen, back, face,	Arms. Legs. face. Abdomen.	No	Either.	3 dys.–3 wks.	Almost constant 3 yrs., then 2 mths., now 15 mths.	Itch and ache	None for 15 mths.	No	—	12	Many.	Few mins.	Months.	Day	Eyelids, penis, nose.
28	Yrs.	15	Left shoulder, arm, *forearm*.	Left forearm.	Upper arm, forearm.	Either.	—	Wks.–mths.	Acute pain.	None for 5 yrs.	No	Forearm.	15	Many.	Few mins.–dys.	Months none for 3 yrs.	Day	Side of nose.
29	2	16	Left leg, wrist, *back*.	No	No	Either.	(4 in 8 yrs.).	(4 in 8 yrs.)	"Crawling" painful.	None for 8 yrs.	No	—	16	Many.	10 mins.–1 hr.	6 months.	Day	Knuckle, shoulder, forearm, back, nose.
30	12/12	12/12	None.	No	No	No	No	—	—	—	Yes.	—	—	—	—	—	—	Forearm.

The figures in the "Residence," the "Illness" and the "First appearance of worm in eye" columns refer to months or years, dating back from the time of reporting the case.

NATIVE CASES.

The information gathered by interrogation in the native African cases is somewhat incomplete and not altogether reliable. The main reason of this was the difficulty in getting the patient to understand the questions. Less than half-a-dozen could speak English and it is doubtful if any of these comprehended it. In some cases as many as five languages were employed so that it is unlikely that a full history was always obtained.

Daily labourers in the Rubber Plantation at Sapele furnished sixty-eight cases and the labouring staff of the Medical Research Institute supplied the remainder.

The Sapele cases were detected during the examination of the blood of a series of 467 natives of all ages. Only one drop of blood, taken between the hours of 11 a.m. and 1 p.m. was examined from each, and the embryos of Filaria (Loa) loa (microfilaria diurna) were found in seventy-five individuals. Seven of these afterwards disappeared so that only sixty-eight could be questioned later.

The Yaba cases occurred amongst twelve labourers, two of whom showed the embryos in the blood. There are four females in the seventy cases, and the ages range from about fifteen to about fifty years.

Thirty-three individuals had lived all their life in the Sapele district and thirty-five others had lived in Chrysops country for three years or longer. Each of the two Yaba cases had visited Aro some years previously for a few weeks' stay, and one of them had been at Sapele during the investigation of the cases there. It is possible that the latter contracted his infection at that time, which means that he showed embryos in his blood within eighteen months, but in neither case can the source of the infection be definitely stated, for Chrysops silacea is reported from Ilaro, *en route* for Aro and *C. longicornis* has been taken at the latter place.

Swellings and the eye condition were noted in twenty-five cases, twenty suffered only from the visits of the worm to the eye, and eight complained of swellings only. All, of course, had embryos in the blood.

A history of the outline of the worm having been seen under the skin was obtained from none, although some of the patients, in whom the worm visited the eye, stated that it also passed under the scalp or downwards towards the mouth.

Seventeen patients on the other hand denied the existence of swellings or the appearance of the worm in the eye.

Of the twenty-five cases in which both swellings and the eye affection co-existed, the onset of the swellings preceded the initial visit of the worm to the eye in seventeen cases by periods ranging from one month to four and a half years. The eye-condition ante-dated the swellings in five cases, the period being seven years in one, three years in two and one year in two cases. In the remaining three cases, these signs of the infection arose together.

As regards swellings, these occurred in thirty-three cases, and the longest history was one of nine years' duration. The sites were not so numerous as in the European cases and in many instances only one site was mentioned. The wrist was affected most frequently and the actual figures are given in Table VIII.

TABLE VIII.

	Site.	Cases.	
	Wrist	17	
	Forearm	13	
	Hand	9	
	Elbow	4	
	Upper arm	1	
Upper limb			44
	Foot	3	
	Calf	1	
	Leg	1	
Lower limb			5
	Loin	1	

The time when the swellings arose was during the night in sixteen, during the day in nine and either day or night in eight.

They were commoner on the right side in ten, on the left in eleven and they affected either side equally in twelve.

A history of two or more swellings at the same time was not elicited from any of the patients, but in two cases the swellings appeared in sequence, one quietening down whilst another arose.

The duration of the individual swellings varied from one day to one month, but is twenty-six cases it was from one to three days.

The period of freedom from swellings was from one week to two months, but in most cases it was three to four weeks.

So far as could be gathered, the swellings were painless, and although a few individuals admitted some feeling of numbness, there was in most cases no discomfort whatsoever. This lack of irritation or other sensation possibly explains the small proportion of swellings reported, as the swellings themselves may not have been sufficiently distinct from the effects of an insect bite, to impress the sufferers.

In the forty-five cases in which the worm made its appearance in the eye, the longest history was one of ten years' duration.

Either eye was visited in twenty-four cases, the right eye only in thirteen and the left only in eight.

The worm usually arrived in the eye during the night in nineteen cases, during the day in eleven, and either day or night in fifteen.

The number of times the worm visited the eye was closely related to the length of the infection, that is, the greater the duration of the infection, the more frequent the visits of the worm. This was not so clear in the European cases, and the most probable explanation is that the native cases were more heavily infected. Their lack of clothing and their more frequent and more prolonged exposure to bites from infected flies render this occurrence likely, and the theory is given additional weight by the fact that in most cases the number of embryos in the blood was very large.

The period of freedom from visits was usually a matter of a month or two.

The worm usually remained in or near the eye for one to three days.

In two cases a worm or worms had been extracted. The usual practice, however, was to apply a decoction of various leaves to the eye with the object of driving it away. Chopped onions were a favourite remedy.

The various data appear in Table IX.

Table IX.

Case.	Swellings.	Sites of Swellings.	Duration.	Period of Freedom.	Eye Condition.	No. of Visits.	Period of Freedom.
1	1 month	Left wrist	few days	...	1 year ...	several	few weeks
2	2 months	,, ...	2 days ...	1 week ...	...	...	...
3	...	...	...	...	3 months	several	few weeks
4	...	...	...	...	,, ...	,, ...	,,
5	4 months	Left forearm	2 days ...	2 weeks ...	,, ...	1 ...	...
6	6 ,,	Right forearm ...	1 day ...	1 week ...	...	...	...
7	...	...	...	...	6 months	3 ...	few weeks
8	1 year ...	Right forearm ...	3 days ...	1 month ...	5 ,, ...	3 ...	,,
9	...	...	...	...	1 year ...	2 ...	months
10	...	...	...	...	,, ...	2 ...	,,
11	...	...	...	...	,, ...	2 ...	,,
12	...	...	...	...	,, ...	4 ...	,,
13	1 year ...	Right forearm ...	6 days ...	2–4 weeks	...	...	...
14	2 years ...	Elbows, wrists, right leg.	3–4 days...	2 weeks ...	1 year ...	5 ...	months
15	,,	Left wrist	1 day ...	some weeks	3 years ...	8 ...	,,
16	...	...	...	...	2 ,, ...	3 ...	,,
17	3 years ...	Hands, wrists	1–2 weeks	a month ...	6 ,, ...	many ...	,,
18	,,	Wrists, left heel ...	2–3 days...	,, ...	1 year ...	1 ...	...
19	,,	Left wrist, foot ...	Few days	few weeks	,, ...	3 ...	months
20	,,	Forearms	2 weeks ...	2 months	6 years ...	many ...	,,
21	,,	Left wrist	1 day ...	a month ...	1 year ...	2 ...	,,
22	,,	Right wrist	3 days ...	4–5 weeks	10 years ...	many ...	,,
23	...	...	...	...	3 ,, ...	several	5 months
24	...	...	...	...	3 ,, ...	many ...	2 weeks
25	...	...	...	...	3 ,, ...	several	months
26	...	...	...	...	3 ,, ...	,, ...	,,
27	...	...	...	...	3 ,, ...	,, ...	1–2 months
28	...	...	...	...	3 ,, ...	2 ...	...
29	3 years ...	Hands, wrists	1 day ...	2 months	...	...	...
30	,,	Forearms	3 days ...	weeks ..	...	...	...
31	,,	Left wrist	1 day ...	,, ...	...	...	...
32	4 years ...	Left forearm	5 days ...	few weeks	3 years ...	2 ...	...
33	,,	Left wrist	2–3 days...	2–3 weeks	1 year ...	2 ...	...
34	,,	,, ...	1 week ...	a month ...	2 years ...	2 ...	...
35	...	...	...	...	4 ,, ...	many ...	2 weeks
36	5 years ...	Elbows, wrists ...	4 days ...	2 weeks ...	5 months	2 ...	...
37	,,	Right forearm, hand	3 ,, ...	weeks ...	3 years ...	several	months
38	,,	Right forearm ...	1–2 days...	months ...	4 ,, ...	,, ...	,,
39	,,	Right hand, elbow ...	1 day ...	,,	5 ,, ...	,, ...	,,
40	,,	Right upper arm ...	1 week ...	1 month ...	4 ,, ...	3 ...	,,
41	,,	Hands, wrists	2–3 days...	3–4 weeks	3 ,, ...	2 ...	...
42	,,	Hands, forearms, right calf.	,, ,, ...	1–3 months	4 ,, ...	several	months
43	,,	Wrists, palms	2 ,, ...	1–6 weeks	4 months	1 ...	...
44	,,	Elbows	2 ,, ...	months ...	...	...	...
45	6 years ...	Right forearm, hand	5 ,, ...	2 months	6 years ...	many ...	4 weeks
46	...	...	...	...	,, ...	2 ...	...
47	...	...	...	...	,, ...	3 ...	...
48	7 years ...	Forearms, wrists, loins	1 week ...	1–2 weeks	...	...	...
49	,,	Left wrist	4 days ...	1 month ...	7 years ...	many ...	months
50	...	...	...	...	8 ,, ...	3 a year	...
51	9 years ...	Right hand	3–4 days...	1 week ...	8 ,, ...	many ...	months
52	...	...	...	...	10 ,, ...	5 ...	many months
53	...	...	...	...	since early youth.	many ...	a year

BLACKWATER FEVER.

Reports have been received from the Medical Officers in charge, of twenty-five cases of Blackwater Fever which occurred in Nigeria during 1922. There were several other cases, but particulars of these were not obtainable.

Although the cases total twenty-five, the number of individuals affected is twenty-four, one patient having suffered from two attacks in the year, the second taking place nine months after the first.

A gratifying feature is, that whereas in 1921 there were twenty-six cases with eight deaths, there was a fatal termination in only three cases in the present series, the lowest death rate of recent years.

A unique occurrence, so far as these annual reports are concerned, is reported from the Northern Provinces, where a husband and wife both contracted the disease at the same station, the former falling ill eight months after the latter.

Three females are included in the present list. Sixteen cases occurred in the Southern Provinces and nine in the Northern. This is the first occasion since 1917 on which the disease has preponderated in the South, notwithstanding its larger European population; it may partly be explained by the closing down of many of the tin-mines and the general contraction of various commercial ventures.

Of the twenty-two males there were fifteen Government Officials and seven non-officials. The former belonged to the following Departments: Railway seven, West African Frontier Force three, Posts and Telegraphs two, and the Legal, Education and Administrative, one case each. The non-officials were engaged in tin mining three, in trade two, in cotton growing one, and in timber cutting, one.

All the patients were British-born except three, two of whom were West Indian negroes and the third a Syrian.

The months in which the attacks took place were January third, February second, March first, April second, May second, June third, August third, September first, October second, November third and December third, so that there is no evidence of seasonal variation in the present series.

The districts or stations in which cases were reported were Ibadan seven, Yola three, Ebute Metta three, Kaduna two, and one case each in Abeokuta, Ede, Iddo, Ifon, Jemaa, Kano, Kwall, Lagos, Sapele and Zaria.

With referènce to the exceptionally large number of cases at Ibadan, the first case occurred in February near the W. A. F. F. lines, well outside the business area. The second case occurred in the business area in April. The third case came from the native quarters in June. The fourth and fifth cases occurred in Moor Plantation, several miles outside the town, one in June and the other in August. The sixth case occurred in the Barracks in August and the seventh case occurred in a patient who travelled daily between Offa and Ibadan.

The age, in the individual cases was twenty-four, twenty-seven, twenty-eight (two cases), thirty (three cases), thirty-four, thirty-five (four cases), thirty-six (three cases), thirty-seven (four cases), forty (two cases), forty-one, forty-five, forty-six and fifty-three years.

The present attack arose during the first visit to West Africa in six cases, during the second visit, in a similar number, during the third in four cases, the fourth in two, the fifth in one, the seventh in two and the eighth and tenth in one case each. There is no information on this subject in two cases.

Table I shows at what month of the tour or visit the attack occurred, in these twenty-three patients.

TABLE I.

	Months.															Years.	
Tour.	1.	2½.	3.	4.	5.	6.	7.	8.	9.	10.	12.	13.	16.	18.	22.	3.	7.
1st	...	...	1	..	...	1	...	...	...	1	...	...	1	1	...	...	1
2nd	...	1	1	...	...	1	...	...	..	...	1	...	...	...	...	2	...
3rd	1	...	...	1	...	...	1	1	...	...	...	...	...	...	...	...	...
4th	...	...	...	...	...		...	...	1	...	...	...	...	...	1	...	...
5th	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
7th	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...
8th	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
10th	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...

The total West African experience (including the few months spent on leave), in those patients who had done two or more tours is shown in Table II.

TABLE II.

	MONTHS.											YEARS.									
Tour.	3	6	10	15	16	17	18	19½	24	28	32	3	4	4½	5¼	6	7	7½	8	9½	16
1st	1	1	1	..	1	...	1	...	...		...	...	...	...	...	...	1	...	...	...	..
2nd	...	...	...	1	...	...	...	1	1	...	...	1	1	...	...	1	...	...	...	...	...
3rd	...	...	...	..	1	1	...	...	...	1	1	...	...	...	...	...		...	...	...	...
4th	...	...	...	...	...	...	...	...	..	...	...	...	...	...	1	...	...	...	1	...	...
5th	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
7th	...	...	...	...	...	..	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...
8th	...	...	...	...	...	...	...	...	.	...	...	...	...	...	...	...	...	...	...	1	...
10th	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1

There was other tropical or sub-tropical experience in twelve cases, as follows.

TABLE III.

Case (3) Panama 4 years.
Case (4) India 7 years.
Case (6) German South West Africa, Mexico, West Indies.
Case (7) Mesopotamia 1 year.
Case (8) Patient born in Syria.
Case (9) Egypt 1 year, Mesopotamia 3 years, India 3 months.
Case (10) Patient born in West Indies (Barbados).
Case (11) ,, ,, ,, ,,
Case (16) India.
Case (19) Ceylon 4½ years.
Case (21) Egypt, Mesopotamia and India
Case (25) Mexico, India, Mauritius.

There was, therefore, sufficient time in these twenty-three cases to allow for more than one malarial infection in West Africa, and in twelve of these there was the additional possibility of having contracted malaria in other countries. There was actually a definite history of previous malaria in twenty-two cases, no records being available in three. The notes as given by the medical officer in charge of the cases, are appended.

TABLE IV.

Case (1) Several attacks of "fever".
Case (2) One attack, malaria.
Case (3) Three attacks, malaria.
Case (4) Several attacks of "fever".
Case (5) Not much malaria.
Case (6) Frequent attacks, malaria.
Case (7) Repeated attacks, malaria.
Case (8) Periodical attacks, "fever".
Case (9) Five attacks, malaria.
Case (11) Occasional attacks, "fever".
Case (12) Frequently recurrent attacks, malaria.
Case (14) "Some fever".
Case (15) ,, ,,
Case (16) ,, ,,
Case (17) Four attacks, malaria.
Case (18) Short attacks, malaria.
Case (20) Frequent slight attacks, malaria.
Case (21) One attack, malaria.
Case (22) Small attacks, "fever".
Case (23) Malaria fairly frequently.
Case (24) Malaria occasionally.
Case (25) Malaria frequently.

A previous attack of Blackwater Fever is recorded in six cases. (All of these recovered from their present illness).

TABLE V.

Case (1) One month previously.
Case (6) Four years previously.
Case (8) Five years previously.
Case (11) Five years previously.
Case (14) One year previously.
Case (20) Ten years previously.

In addition to these there is the second attack in Case (5) which is in the records as Case (22).

The habits as regards the use of Quinine in prophylaxis are noted as under.

TABLE VI.

Case (1) Hydrochloride, tabloid grs. x weekly.
Case (2) Grs. v twice weekly.
Case (3) Bisulphate, grs. v daily.
Case (4) None.
Case (5) Bisulphate, grs. v each morning.
Case (6) Bihydrochloride, grs. v daily.
Case (7) Bisulphate. „ „
Case (8) None.
Case (9) Hydrochloride, tabloid grs. v daily.
Case (10) None.
Case (11) Grs. v irregularly.
Case (12) Hydrochloride grs. *ii* daily.
Case (14) Hydrochloride grs. v twice weekly.
Case (15) „ „ five days a week.
Case (16) „ „ daily.
Case (17) Bisulphate grs. v every other day.
Case (18) „ „ solution regularly.
Case (19) Grs. v daily, usually.
Case (20) Hydrochloride grs. v irregularly.
Case (21) „ „ tabloid irregularly.
Case (22) Grs. *ii* daily.
Case (23) Grs. v liquid, seldom missed.
Case (24) Occasionally.
Case (25) Hydrochloride grs. v fairly regularly.

The above data are of interest in so far as they show that in each instance the Quinine used as a prophylactic failed in its object, as shown by the previous tabular statement. It has to be emphasised, however, that very few took what is usually regarded as an adequate preventive dose. Even amongst those who claimed to have taken the regulation five grains per day, there is every likelihood that the actual time of day at which it was taken, varied. There is every possibility too, that the list includes persons who put all their trust in Quinine and neglected other prophylactic measures, such as the wearing of mosquito boots.

The administration of Quinine prior to the onset of the actual attack of haemoglobinuria is indicated in the subjoined table. "Onset" refers to the time which elapsed between the taking of the last dose of Quinine and the first appearance of haemoglobinuria.

TABLE VII.

Case.	Salt.	Form.	Dosage.	Onset.
1	Hydrochloride	Solution	10 grains in two doses	2 hours.
2	,,	Tabloid	25 ,, ,, three ,, (10, 5 and 10)	15 ,,
3	,,	,,	10 ,, day before, 15 grains in two doses (10 and 5)	10 ,,
5	Bisulphate	,,	10 ,,	14 ,,
6	Bihydrochloride	,,	20 ,, daily in 2 doses (10 each) for two previous days. 10 grains	9 ,,
7	Bisulphate	,,	20 ,, in two doses (10 each)	6 ,,
8	Hydrochloride	,,	5 ,, on morning previous, 5 grains	16 ,,
11	,,	,,	30 ,, in three doses (10 each)	6 ,,
12	,,	,,	15 ,, in two doses (10 and 5)	2 ,,
13	,,	Intramuscular	10 ,, on each of 3 previous days	18 ,,
15	,,	Tabloid	15 ,, in three doses (5 each)	2 ,,
16	,,	,,	5 ,, twice daily 3 previous days	4 ,,
17	Bisulphate	,,	5 ,,	24 ,,
18	,,	,,	20 ,, in two doses (10 each)	8 ,,
20	Sulphate	Solution	5 ,,	10 ,,
21	,,	,,	20 ,, in two doses (10 each)	1 hour.
22	?	Tabloid	$2\frac{1}{2}$,,	3 hours.
23	Bisulphate	Solution	10 ,,	1 hour.
24	Sulphate	,,	10 ,,	1 ,,
25	Hydrochloride	Tabloid	5 ,,	5 hours.

In addition to the above, in case (9) the patient had no Quinine for five days before the onset of the haemoglobinuria, although previously he had taken five grains per day. In Case (10) the patient took no Quinine whatsoever.

In Case (12) although the patient had taken 15 grains Quinine during the 12 hours previous to the onset of Blackwater Fever, she had taken no Quinine for three weeks.

It will be seen that in no case was the dosage of Quinine excessive. Indeed, in most cases it was singularly small and in two cases it cannot be implicated as an exciting cause of the illness.

The history of the illness is not given in all the reports, but the following is a resume of the cases which were more fully described.

Case (2) 4/1/22. Rigor at 8 a.m. Took ten grains Quinine at 10 a.m. and five grains at 2 p.m. Seen at 3 p.m. Face flushed, breathing quick, pulse 110, temperature 105° F. Had vomited twice. Given ten grains Quinine at 5 p.m. At 7 p.m. temperature 103° F. and at 10 p.m. 102°·4 F. Patient slept.

5/1/22. Another rigor at 8 a.m. temperature 102°·4 F. and urine dark red. During the day, passed thirty-five ounces urine showing steady gradation from dark port to normal colour. Pains in lumbar region. No vomiting. Evening temperature 98°·6 F.

6/1/22. First specimen urine, 8 a.m. reddish, next and succeeding specimens clear. Icteric tinge of skin, conjunctivae yellow. No further rise of temperature; convalescence rapid. .

Case (3) Had an attack of "fever" which did not subside in a week, so journeyed many miles to consult Medical Officer.

4/1/22. Admitted to Hospital 2 p.m. Temperature 100° F. Given ten grains Quinine. Evening temperature 101° F.

5/1/22. Morning temperature 98°·6 F.; given other ten grains Quinine. At mid-day, other five grains Quinine. Shortly thereafter a severe rigor, temperature 104° F., vomiting, pains in head, back and legs. Black water at 10 p.m.

6/1/22. Temperature became normal, urine cleared.

11/1/22. Rise of temperature to 101°·8 F., pains in head and legs. No haemoglobinuria.

12/1/22. Temperature normal. Pains gone. Convalescent.

Case (6). 6/3/22. Felt out of sorts, had mental worry and anxiety. Took ten grains Quinine. Evening temperature 102° F. Rigor during night, and vomited. Repeated the dose of Quinine.

7/3/22. Felt no better. Took ten grains Quinine morning and evening.

8/3/22. Took ten grains Quinine in morning. At 6 p.m. passed dark urine.

9/3/22. Another rigor, slight vomiting and diarrhoea, slight jaundice, no pains, urine nearly clear by night.

10/3/22. First seen by Medical Officer. Morning temperature 100°·4 F., urine clearing. At noon, temperature 102°·2 F. and urine darker again. At 10 p.m. urine clear, temperature 99° F.

11/3/22. Temperature normal. Urine clear. Convalescent.

Case (7). 10/4/22. Patient felt depressed. Complained of headache. At 2 p.m. and again at 7 p.m. took ten grains Quinine Bisulphate. About midnight, a severe rigor.

11/4/22. 1 a.m. Passed stout-coloured urine. Seen by Medical Officer. 3 p.m. temperature 100° F., skin tinged yellow, tongue coated, great thirst and headache, no bodily pains, spleen and liver enlarged and tender. At 4 p.m. a severe rigor. At 6 p.m. temperature 103°·4 F. Vomiting began. At 11.30. p.m. another rigor and temperature 103°·8 F.

12/4/22. 6 a.m. Temperature normal. Urine clear by night, temperature fluctuated between 98° F. and 100° F. until 28/4/22, temperature rose to 101°·2 F., subtertian parasites found in blood, Quinine tannate in two grain doses four times a day, temperature became normal, remained so, and patient convalescent.

Case (8). (A Syrian). 26/4/22. Fever and "colic." Took five grains Quinine. 27/4/22. Feeling no better. Took other five grains Quinine. 28/4/22. 10 a.m. passed claret-coloured urine, rapidly progressing to black. Severe vomiting and abdominal pain, jaundice marked. Temperature 100°·6 F.–102° F. 29/4/22. Had three rigors at intervals of about 8 hours, vomiting and pain continued. Enlargement and tenderness of both spleen and liver. Profuse sweating. Excessive thirst. Temperature 99°·8 F.–103° F.

30/4/22. Urine clearing, vomiting and pains less. Temperature 100°·2 F.–102°·2 F.

1/5/22. Urine clear by night. Temperature subsiding.

4/5/22. Temperature reached normal and remained so.

Case (9). Had been feeling unwell for 8 days with vomiting and fever. Signs were those of a Hepatitis with gastric disturbance. Quinine stopped, appropriate remedies applied. Five days later, suddenly felt much worse, had rigor and passed black-water at 5 p.m. 12/5/22.

13/5/22. 2 a.m. temperature 104° F. Vomiting began. Urine black all day. Temperature at night 102° F.

14/5/22. Morning temperature 100° F. Urine clearing. Noon temperature 101°·4 F. Evening temperature 100° F., urine clear.

15/5/22. Urine clear. Vomiting ceased. Temperature 101° F. —103°·2 F. Temperature fluctuated between 99° F. and 101° F. until 23/5/22 when temperature normal and remained so. Quinine was given five grains per rectum on 16/5/22, and intramuscularly five grains daily on the next two days. The urine passed at midday on 18/5/22 was dark, but the next specimens were clear until midday 19/5/22, when the specimen was again dark. There were no further relapses.

Case (11). Had "fever" on 4/6/22 and 5/6/22. Took ten grains Quinine each day. 6/6/22, took other ten grains Quinine and at 6 p.m. had rigor and passed port-wine urine. Temperature 103° F. Acute abdominal pain and vomiting. Liver and spleen not palpable. Tenderness over epigastrium and right hypochondrium.

The urine cleared in 36 hours. The epigastric pain and nausea continued for three days. The temperature oscillated between 99°·6 F. and 98° F. for a week.

Case (12). Frequently recurring headaches for three weeks, with occasional retching, some diarrhoea and abdominal pains. During this period patient stopped taking the usual two-and-half grains Quinine daily. There was a persistent urticaria.

14/6/22. Fever and retching in the evening.

15/6/22. No better. Took ten grains Quinine at 10 a.m. At noon temperature normal. Diarrhoea and pain and tenderness in epigastrium and right hypochondrium. Edge of liver and spleen palpable, and tender. At 8 p.m. took other five grains Quinine. At 10 p.m. temperature 102° F., another retching attack with abdominal pain, and passed claret-coloured urine.

16/6/22. Morning temperature 101°·4 F., evening temperature 97° F., urine never got darker than claret-colour and it cleared entirely in 14 hours. Temperature remained normal until 25/6/22 when it reached 99°·6 F., there was a retching attack, and haemoglobinuria returned. This relapse lasted only 12 hours, after which convalescence was established.

Case (13). Admitted to hospital with subtertian malaria (blood examination). Treated with intramuscular injections of Quinine, ten grains daily for three days. On evening of 3rd day in hospital, had diarrhoea and felt ill. During the early hours of next morning he was very restless, complained of headache, and passed black water. The temperature at 6 a.m. on this day, 25/6/22, was 103° F. In the afternoon there was a rigor and temperature rose to 103°·4 F. Jaundice present.

26/6/22. Temperature normal. Urine began to clear in afternoon and was clear by night. Convalescent.

Case (15). 8/8/22. Slight "febrile" attack with abdominal pain and tenderness. Spleen palpable.

11/8/22. Apparently well again.

15/8/22. Felt unwell again and took Quinine Hydrochloride grains 5 three times during the day, at 6 p.m. sudden rigor and faint feeling. Temperature 105° F. 9 p.m. passed black urine.

16/8/22. Jaundice general. Liver and spleen palpable. Temperature, morning 104°·2 F., evening 102° F. Urine clearing.

17/8/22. Morning temperature 101°·4 F., evening 99°·6 F. Urine clearing.

18/8/22. Morning temperature 99° F. Urine clear. Evening temperature 99°·6 F., urine red again.

19/8/22. Temperature hovering round 99° F. Urine clear, by mid-day. Convalescence established.

Case (16). During evening of 18/8/22, a sudden attack of abdominal pain with vomiting and diarrhoea. Temperature 102° F. Took two five-grain doses of Quinine, on 19/8/22, 20/8/22, and 21/8/22, during which time he felt better but during the night of 21/8/22 he had a return of the vomiting, abdominal pain and diarrhoea, followed by a rigor and six hours later he passed blackwater. The temperature then was 102° F. 22/8/22. Temperature fell to normal and urine cleared rapidly.

23/8/22. Temperature rose to 100°·2 F., and urine again red in morning. In evening temperature normal and urine clear. The spleen was palpable throughout the illness.

Case (18). The attack occurred after a day of general malaise.

There were rigors on the first and second days of illness.

There was frequent vomiting. The temperature was remittent, between 104°·2 F., and 98°·8 F. for two days, during which time the urine cleared. On the third day the temperature was 101°·2 F., but from the fourth to the nineth day it was consistently round 102° F. On the nineth day there was a return of haemoglobinuria, lasting six hours and another on the following day lasting three hours. Convalescence was very slow as the patient was anaemic and debilitated prior to his attack.

The duration of haemoglobinuria, in those cases in which there were neither remissions nor relapses, varied between fifteen hours and 108 hours. The actual duration, in thirteen cases was, 15, 24 (two), 36, 39, 46, 48, 60, 72, 90, 96 (two) and 108 hours.

Only one definite remission is noted, Case (6), in which the urine became darker again on the second day.

There were one or more relapses in eight cases, the details of which are as follows. In Case (2) the initial haemoglobinuria lasted ten hours, the urine was clear for twelve hours and then became red again for three hours. In Case (5) the urine cleared in less than twenty-four hours, but twelve days later there was haemoglobinuria lasting forty-eight hours. This patient had been given five grains Quinine in solution for three days prior to the relapse. In Case (9) the haemoglobinuria lasted forty-eight hours. Twenty-four hours thereafter, Quinine, five grains per rectum, was given and on each of the two following days five grains intramuscularly. A few hours after the second intramuscular injection one specimen of urine was red, and the same phenomenon occurred on the following day, although no more Quinine had been given. On each of these days only one specimen of urine was red, the others were normal. In Case (12) the initial attack passed off in ninety-six hours and five days later the urine was red again for twelve hours. In Cases (15) and (16) the urine cleared in sixty hours and three days later haemoglobinuria returned, lasting twelve hours in the former and twenty hours in the latter. In Case (18) the urine became normal after two and-a-half days, but a week later there was a return of the haemoglobinuria lasting six hours and a second return on the following day lasting three hours. Case (24) was rather remarkable. The following tabular statement shows the condition as regards the urine.

TABLE VIII.

1st and 2nd days.			3rd day.	4th, 5th and 6th days.		7th day.
10 a.m.	2 p.m.	6 p.m.	—	10 a.m.	6 p.m.	—
Black.	Clear.	Black.	Clear.	Clear.	Black.	Clear.

Albuminuria, as a rule, cleared up within a few hours of the disappearance of haemoglobin, but in the following cases it persisted. In Case (3) it persisted for three days after the urine became clear. In Case (7) it was one and a half days longer in duration. In Case (10) albuminuria was present up till death on the eighth day of illness, the haemoglobinuria having cleared up in four days. In Case (11) it was three and a half days longer in duration. In Case (17) albuminuria was present up till the day of death on the sixth day of illness, the haemoglobinuria having disappeared after two and a half days. In Case (20) albuminuria continued over five days, although the urine cleared in fifteen hours. In Case (22) it was a week after the disappearance of the haemoglobinuria that the urine was free from albumin.

In the three cases which terminated fatally, the cause of death was Cardiac Failure in Case (10). The patient was a female Missionary aged 30 years, a West Indian, who only three months previously had arrived from Barbados. The illness lasted eight days, during which time the temperature never became normal. Haemoglobinuria cleared after four days but albuminuria persisted, urine being passed in good amount. In case (17) death took place on the seventh day of illness from suppression of urine. The haemoglobinuria cleared up on the third day. The patient was aged 45 years and his present tour was one of twenty-two months. He was a heavy consumer of alcohol. In Case (25) the illness lasted three days. Death occurred from Cardiac Failure. Patient was aged 53 years. He also had not been home for twenty-two months.

The blood was examined in every case except one, in which the smears were destroyed. In six cases the only report is "no parasites found," and in one of these there was a mononuclear increase. The details of the remaining cases are:—

TABLE IX.

Case.	When Examined.	Results.
1	3rd, 4th, 5th, 7th and 8th days ...	No parasites. Consistently high mononuclear counts.
7	1st, 2nd, 3rd and 4th days ...	Subtertian rings 1st day. Pigmented mononuclears 2nd day.
8	1st day	Subtertian rings.
9	,, ,, ...	,, ,,
11	,, ,, ...	,, ,,
12	,, ,, ...	,, ,,
13	1st and 2nd day	,, ,,
14	? 1st day	,, ,,
15	1st day	,, ,,
16	st day and 1st day of relapse	No parasites 1st day. Subtertian rings 1st day of relapse.
18	1st, 2nd, 3rd, 4th, 5th, 7th, 9th and 10th days	Subtertian rings 1st and 2nd day, pigmented mononuclears 3rd day.
19	1st, 2nd and 3rd days	Subtertian rings 1st day, no parasites 2nd and 3rd day.
20	3rd day	Subtertian rings.
21	2nd day	,, ,,
22	1st ,, ...	,, ,,
23	,, ,, ...	,, ,,
24	,, ,, ...	,, ,,
25	3rd day	No parasites.

Thus no parasites were found in 8 cases and subtertian rings were found in 17, although in one of these it was not until the relapse occurred that a positive finding was obtained.

There are only two cases in which a series of differential leucocyte counts and Arneth counts was done.

The details of these are seen in Table X.

TABLE X.

Case.	Day.	Paras.	Pigm.	P.	S.	L.	M.	E.	T.	Ma.	My.	Er.	V.	N.	Me.	I.	II.	III.	IV.	V.
7	1st	Subt.	+	49·6	19·2	5·2	20·8	...	4·6	...	0·6	...	13	...	...	80·4	17·6	2	...	...
—	2nd	—	+	52·	15·6	3·2	24·4	...	2·8	...	2	5	14	...	...	86·	12·	2·	...	...
—	3rd	—	—	69·4	17·6	2·4	5·4	0·2	0·8	...	4·2	...	2	...	...	81·6	16	2·4	...	...
—	4th	—	—	46·	23·2	2·8	22·8	1·2	0·8	..	3·2	...	3	...	...	83·2	14·4	2·4	...	...
18	1st	Subt.	+	70·8	9·2	3·	10·8	0·6	2·2	...	3·4	...	2	...	...	71·8	21·6	5·6	0·8	0·2
—	2nd	,,	+	75·	9	1·4	9·8	0·2	2·4	0·2	2·	3	2	...	...	64·	28·4	7·2	0·4	...
—	3rd	—	+	77·8	12·	1·4	6·	...	1·6	...	1·2	...	3	...	...	58·4	29·2	11·2	1·2	...
—	4th	—	—	63·4	21·4	2·4	9·4	0·2	2·	..	1·2	...	...	3	...	56·8	32·	10·	1·2	...
—	5th	—	—	59·	25·	3·2	8·4	0·6	2·2	...	1·6	...	...	7	...	46·8	36·4	15·6	1·2	...
—	7th	—	—	71·6	12·2	2·2	5·2	1·	3·4	...	1·4	...	1·	11·	6	56·8	30·8	11·2	1·2	...
—	9th	—	—	71·8	12·6	2·2	4·4	1·4	2·6	...	5·	...	1·	11·	2·	52·	33·2	13·2	1·2	0·4
—	10th	—	—	65·2	12·2	2·2	13·	1·2	3·6	...	2·6	1·	2.	8.	2·	57·6	34·	7·6	0·8	...

In the above table, Paras=Parasites. Pigm=Pigment in mononuclear cells. P=Polymorphonuclears. S=Small lymphocytes. L=Large lymphocytes. M=Mononuclears. E=Eosinophils. T=Transitionals. Ma=Mast cells. My=Myelocytes. Er=Erythrophages. V=Vacuolated mononuclears. N=Normoblasts. Me=Megaloblasts.

The Roman numerals refer to Arneth's divisions of the Polymorphonuclears.

Reports were received from the following, to whom grateful acknowledgment is made:—Dr. Birt, Dr. Booth, Dr. Cobb, D.S.O., Dr. Craig, Dr. Digby, Dr. Lee, Dr. Mackey, Dr. Maclaine, Dr. Nicholson, Dr. Parkinson, Dr. Thompson and Dr. Wood.

INTESTINAL COCCIDIOSIS.

In the early part of the year, oöcysts of a Coccidium, Isospora hominis, were found in the fæces of a European who suffered from intestinal derangement. This condition had not previously been recorded from the British West African Colonies, although Noe in 1920 described a case which he met with in Dakar. The history of the Nigerian case was somewhat obscure and it was not possible to eliminate Entamœba histolytica as a cause of the diarrhœa. In conjunction with Dr. W. A. Young, a short note was contributed to the Transactions of the Royal Society of Tropical Medicine and Hygiene, vol. XVI, p. 90, describing the findings. A few weeks after the first case occurred, a second was met with, under circumstances which made it practically certain that it was an instance of direct transmission from the first. This second case suffered from a definite illness which it was possible to study closely from beginning to end. The following is a summary of the investigations, the full report of which has been published in the Transactions of the Royal Society of Tropical Medicine and Hygiene, vol. XVI, pp. 223–245.

Until the outbreak of the war in 1914 only a few cases of Intestinal Coccidiosis had been reported, and most of these were only discovered post-mortem. In 1915, however, the finding of cocysts in the fæces of soldiers who had been invalided with intestinal complaints from the Eastern Mediterranean War Zone, (Salonika, Gallipoli, Egypt and Mesopotamia), led to a greatly increased interest in the subject.

Dobell, in a Monograph published in 1919 "A Revision of the Coccidia parasitic in Man Parasitology XI, 147," states that the literature previous to that date was in a state of chaos, out of which it was difficult to bring order. He re-described and placed on a sound scientific basis the two genera of Coccidia, Isospora and Eimeria, revised the description of Isospora hominis and placed on record two new species of Eimeria, E. wenyoni and E. oxyspora. Furthermore he eliminated all the unacceptable cases of Isospora infection, limiting them to not more than five authenticated cases. The striking feature, therefore, is that previous to 1914 there were five cases, and after 1914, to the present date, 148 cases were reported. The great bulk of these came from the Eastern Mediterranean area during the years 1915–1918. Thereafter they were reported mostly in single numbers from various parts of the world. In seeking for an explanation of this sudden and great increase in the number of cases, it has to be borne in mind that during the war a much larger number of trained observers than had ever been brought together before, were engaged in the examination of the fæces of a very greatly larger number of persons than had ever previously been examined. Nevertheless, the conviction was forced upon one, that a focus of the infection, up till 1915 localised and circumscribed, was disturbed by a considerable influx of combatants, who, in the course of time, spread the disease in sporadic, widely separated cases.

Another interesting feature was the absence of proof of the pathogenicity of Isospora hominis and the general belief that the parasite was harmless. Authorities as Dobell, Wenyon and others, whilst admitting the possibility, were unable to find definite evidence of illness resulting. Noe and Haughwout, on the other hand, both attributed pathogenicity to the organism. In the present case, the patient received his infection on 16th February, 1922. Six days later he developed diarrhœa, which persisted for thirty-one days, six to eight motions being passed per day. Three weeks after the commencement of diarrhœa, oocysts of Isospora hominis were found in the stool. They were noted each day thereafter for eight days. No other intestinal protozoa were found and particular care was taken to exclude other causes of diarrhœa. The fæces presented no special features, macroscopically or microscopically until the time when oocysts were being passed. Then they were of a thick oily consistency with signs of gaseous formation. The usual fæcal odour was lacking, the smell being that of fermenting matter. In appearance they were marbled with yellow points and streaks in a brown matrix. Microscopically, unaltered fat, much meat-fibre and starch were observed, along with cocysts and Charcot-Leyden crystals.

The general disturbance was not great. There was increasing weakness and lack of energy, a dull ache in the pit of the stomach and some flatulence. The patient lost flesh and was invalided a month after the onset of illness.

He recovered rapidly on the voyage home and there has been no return of the symptoms.

The conclusion was reached that Isospora hominis in man, like other species in other animals, may be present without causing obvious signs of illness, but that, on the other hand, it may, in some instances, cause definite intestinal disturbance.

No satisfactory method of treatment has been evolved, but it appears the disease is self-limiting, and in no case has it been noted as of grave import.

ENTOMOLOGICAL.

Three hundred and twenty-seven collections of mosquito larvæ obtained by the Sanitary Inspectors during their daily visits to the houses in the Lagos Municipal Area, were kindly sent by the Medical Officer of Health. The following tables show the conditions obtaining.

Table I.

MOSQUITO LARVÆ.

	January.	February.	March.	December (latter part).	
Stegomyia fasciata ...	92	68	66	19	245
Culiciomyia nebulosa ...	37	12	12	10	71
Culex fatigans	5	—	1	3	9
Anopheles costalis ...	2	4	2	—	8
Culex decens	1	—	—	—	1
Culex thalassius . .	-	1	-	—	1
	137	85	81	32	335

Table II.

RECEPTACLES.

	St. fasc.	Cul. neb.	St. fasc & Cul. neb.	St. fasc & A. cost.	C. fat.	C. dec.	A. cost.	C. thal.
Water Pot ...	201	31	1	4	2	1	—	—
Agbo Pot	4	32	1	—	—	—	—	—
Tin	12	1	—	1	—	—	—	—
Barrel	7	1	—	—	—	—	—	—
Catchpit	3	1		—	3	—	1	–
Pool	—	—	—	—	2	—	2	1
Bucket	3	—	—	—	—	—	—	—
Drum	3	—	—	—	—	—	—	—
Well	2	—		—	—	—	—	—
Jug	1	—	—		—	—	—	—
Truck	1	—	—	—	—	—	—	—
Swamp	—	-	—	—	1	—	—	—
Dye-pot	—	1	1	—	—	—	—	—
Dung pot	-	1	—	—	—	—	—	—
Canoe	—	—	—	—	1	—	—	—
	237	68	3	5	9	1	3	1

It will be seen that the larvæ of only six species of mosquitos were found. Stegomyia fasciata greatly outnumbered all the others put together, and Culiciomyia nebulosa was also abundant, Culex fatigans, Anopheles costalis, Culex decens and Culex thalassius were scarce, the last two having been found only once.

The only larvæ which were noted to have lived in the same receptacles at the same time were those of Stegomyia fasciata and Culiciomyia nebulosa, and Stegomyia fasciata and Anopheles costalis.

Household pots were the most frequent breeding places, these including water-pots, cooking-pots, medicine-pots and dye-pots.

The following experiment designed to ascertain how long a female Stegomyia fasciata will continue to lay fertile eggs after the male has been removed, was begun on 4th November. It finished on 18th December by the accidental killing of the mosquito.

4th November. One ♀, 2♂♂, Stegomyia fasciata, all hatched from the same batch of larvæ, were put into a glass jar, along with a beaker of water.

The ♀ was fed on the arm, the ♂♂ on sugar.

9th November. Many eggs laid. Female fed on arm. Males removed.

12th November. Many eggs. Eggs of 9th November, hatched.

14th November. Many eggs laid. Eggs of 12th November, hatched.

16th November.	Eggs of 14th November, hatched.
17th November.	Mosquito fed.
22nd November.	A few eggs laid. Mosquito fed.
25th November.	Eggs of 22nd November, hatched.
26th November.	Fair number of eggs laid. Mosquito fed.
29th November.	Eggs of 26th November, hatched.
30th November.	Many eggs laid.
3rd December.	Eggs of 30th November, hatched.
7th December.	Mosquito fed.
10th December.	Fair number of eggs laid.
13th December.	Eggs of 10th December, hatched out.
18th December.	Mosquito killed by accident.

The mosquito was offered a feed of blood each morning, which was refused except on the days specified above. A piece of sugar was kept in the jar. Each time a batch of eggs was laid the beaker was removed and replaced by a fresh beaker of water.

It will be seen that eggs were laid on 9th, 12th, 14th, 22nd, 26th, and 30th November and on 10th December. In each instance the eggs were fertile, although the males were removed on 9th November. A blood feed was taken on 4th, 9th, 17th, 22nd and 26th November and on 7th December.

The periods between blood feed and egg-laying were five days, three days, five days, five days, four days, four days, three days.

The eggs hatched in three days, two days, two days, three days, three days, three days, three days.

A female Stegomyia fasciata, therefore, can produce fertile eggs during a period of thirty-one days, after the last opportunity of fertilisation by the male.

The following blood sucking insects were received for identification.

Chrysops silacea 4♀♀, *C. dimidiata* 2♀♀ from Itu. These were dissected, but no larvæ of Filaria (Loa) loa were found.

Anopheles funestus 15 ♀ ♀, Culex decens 7 ♂ ♂, 2 ♀ ♀ and C. tigripes 2 ♂ ♂ from Dundage (Sokoto).

Anopheles costalis 1 ♂, 1 ♀, Anopheles funestus 3 ♂ ♂, 2 ♀ ♀, Anopheles rufipes 1 ♂, Culex fatigans 13 ♂ ♂ 13 ♀ ♀, Culex decens 8 ♂ ♂, 10 ♀ ♀, Culex univittatus 1 ♀ from Sokoto town.

Tabanus tæniola and Stomoxys calcitrans from Ilorin.

The work in this section was, as usual, performed by Mrs. S, L. M. Summers Connal, M.B.E., M.A., B.Sc.

ROUTINE WORK.

In addition to the material examined at the Clinical Laboratory attached to Lagos Hospital, a certain amount has been received at the Institute from other sources.

Ninety-nine blood smears have been examined, eighty-three from Europeans and sixteen from natives. Amongst the former, malaria parasites were found in ten, subtertian in nine and quartan in one. Trypanosomum gambiense was found once, and embryos of Filaria (Loa) loa and Acanthocheilonema perstans once.

Malarial parasites were found in six natives, subtertian rings in all, along with crescents in three. Tables I and II show particulars.

TABLE I.—EUROPEANS.

No.	Subtertian.	Trypanosomes.	Loa & perstans embryos.	Quartan.	Differential Counts.	Neg.
83	9	1	1	1	21	71

TABLE II.—NATIVES.

No.	Subtertian.	(Crescents).	Differential Counts.	Neg.
16	6	3	10	10.

One hundred and fifty-eight samples of faeces were examined, one hundred and thirty-six from Europeans and twenty two from natives. In the Europeans the most frequent pathological finding was the Entamoeba histolytica and in the natives, ova of parasitic worms predominated. The following were the results.

TABLE III.—EUROPEANS.

Pus, epithelial and red blood cells, and E. histolytica ...	10.
Pus and epithelial cells and E. histolytica	14.
E. histolytica cysts	6.
Iodamoeba butschlii	5.
Chilomastix (Tetramitus) mesnili	3.
Isospora hominis	2.
Lamblia intestinalis	1.
Cercomonas	1.
Trichocephalus dispar ova	1.
Charcot-Leyden crystals	5.
Negative	93.

TABLE IV.—NATIVES.

Pus, epithelial and red blood cells. E. histolytica	2.
E. histolytica	2.
Trichocephalus dispar ova	8.
Ascaris lumbricoides ova	6.
Ankylostomum duodenale ova	5.
Strongyloides larvae	2.
Iodamoeba butschlii	1.
Chilomastix (Tetramitus) mesnili	1.
Trichomonas	1.
Negative	7.

Ten specimens of sputum were examined, tubercle bacilli being found in samples from two natives.

Seven samples of urine were examined, glucose being present in two.

Four agglutinating tests with the typhoid group and three with the dysentery group of bacilli were done, all with a negative result.

As regards venereal disease the following material was dealt with.

Wassermanns	6	(3 positive)
Sachs Georgi	4	(3 positive)
Urethral smears	5.	(Gonococci in 4)
Vaginal ,,	2	(,, ,, 2)
Chancre ,,	2	(both negative)

Other smears examined were:—

Brain abscess	2	(mixed)
Lung smear	1	(pneumococci)
Eye pus	1	(Koch-Weeks bacilli)
Nose smear	1	(B. leprae)
Ear pus	1	(mixed)
Gland juice	1	(no trypanosomes)

Inflammatory exudates, were:—

Knee joint	2
Peritoneal	1
Pleural	1
Cerebro-spinal fluid	1.

Three Vaccines were prepared.

Water samples from Apapa, Iju, and Offa were analysed. Ordeal bark and Ogbuana roots, used as native poisons, were received for examination.

A sample of Beer was analysed.

The following tissues and tumours were examined.

Round-celled sarcoma of pelvis
,, ,, ,, ,, scapula.
Epithelioma of leg
,, ,, scrotum
Carcinoma, liver
Scirrhus, breast
Ovarian cyst
Submaxillary Myxo-adenoma
Syphilitic cirrhosis, liver
Fibro-cystic thickening, hernial sac.

An adult Filaria (Loa loa) ♀, removed from the eye of a native woman, was received.

Grateful acknowledgment of material provided is made to Dr. Aitken, Dr. Booth, Dr. Clark, Dr. Cobb, D.S.O., Dr. Craig, Dr. Digby, Dr. Dyce Sharp, Dr. Franklin, Dr. Glover, Dr. Gray, Dr. Grey, Dr. Grieve, Dr. Maples, Dr. Martyn Clark, Dr. Moiser, Dr. Morehead, Dr. Parkinson, Dr. Pollard, Dr. Ross, Dr. Sapara, Dr. Smith, Dr. Stephens, Dr. Stewart, Dr. Thomson, Dr. Williams and Dr. Wood.

A. CONNAL,
Director, Medical Research Institute,
LAGOS.

MEDICAL RESEARCH INSTITUTE.

Branch Clinical Laboratory,
Colonial Hospital,
LAGOS.

Director,
Medical Research Institute,
Yaba.

Sir,

I have the honour to submit to you the Annual Report of the work done here.

As you are already aware this Laboratory was opened on the 16th February, 1922.

Its existence, I think, is amply justified by the amount of work done—by the fact that specimens are obtained fresh—by the opportunity of making numerous post-mortem examinations and of sectioning the pathological specimens thus obtained.

It is an excellent station for feeding a Research Institute like Yaba. Several features stand out in the work done which are of value:-

1. The complete absence of a definite case of Bacillary Dysentery.
2. The high incidence of Malaria amongst European Officials.
3. The great need for a more definite knowledge of detail tropical histo-pathology. Much work requires to be done in this connection in West Africa, but it requires a larger staff to make it possible in a real sense. I know our efforts here have been greatly appreciated by the Staff of the Colonial Hospital and I do not think it presumption to say it has facilitated their work.

I must especially thank Dr. Parkinson—Surgical Specialist, and Dr. H. H. Stewart—Radiologist (and for a time M. O., Lagos) for their very great assistance at the inauguration of the Laboratory and mutual co-operation since: also Dr. Dilke and Dr. Birt.

The staff has consisted of myself, Mr. Hines, Laboratory Attendant, Yaba—part time—and Mr. Sawyerr, Native Assistant, who has shown great zeal.

Dr. Quintin Stewart has from time to time done pathological work while acting as M. O., Lagos, and since the middle of November, has been attached to the Laboratory and is also acting as Radiologist. He is relieving me shortly when I go on leave.

It behoves me to speak, with pleasure, very highly of the excellent histo-pathological work he has done.

Leper work was also carried on at Yaba Leper Asylum and during November-December a visit was made to Warri to investigate a small outbreak of Yellow Fever.

I have the honour to be,
Sir,
Your obedient Servant,

(Sgd.) W. A. YOUNG.

ROUTINE EXAMINATION OF BLOOD.

Every patient now admitted to the Hospital has a blood film made and examined.

Usually Leishman's Stain was used but where very clean and especial detail was required, Giemsa's method was employed, *i.e.* diluted one in twenty-five, the slides fixed in Alcohol (Methyl) and stained overnight.

The total bloods thus examined were 1,604.

European	258	1,604.
Native	1,346	

European films showed subtertian malarial parasites in 183 cases.

In these days of enlightenment this appears a very high figure because one must also remember the numerous cases of fever which are not admitted to Hospital.

This high figure appears to be accounted for by :—

1. Lack of scientific prophylaxis by quinine.
2. The refusal, based on ignorance, of some people to use quinine as a prophylactic.
3. Possible partial or non-absorption of the alkaloid due to (*a*) Gastritis, alcoholic or otherwise, (*b*) incorrect mode of administration.
4. The assumption that regular quinine-taking has a detrimental effect on one's physical and mental capacities.

Let us examine these in detail.

1. Quinine, to be of use as a prophylactic, must be used in a common-sense manner.

A five grain dose is a useful dose for average people under average tropical circumstances. But five grains is of no use to the twenty stone man nor for the greatly fatigued man and although of use for the ordinary one or two bites of infected anopheles, cannot be for a man possibly bitten by twenty infected anopheles.

Thus the five grains must on occasions be increased temporarily and in some cases permanently.

2. Ignorant refusal may be due to advice from "old Coasters" who have luckily survived, and others who have lived under more sanitary conditions and so been free of fever.

3. Gastric conditions, which probably also entail some inflammation of the duodenum, certainly have their effect on non-absorption of the alkaloid. In my opinion undoubtedly alcohol is one such inimical agent.

From various experiments on myself, I have come to the conclusion that liquid quinine is easily the best and that the best time for taking it is before breakfast.

This seems reasonable because the stomach has had a night's rest and time to recover from the efforts of the day before, and it should then be in a good condition to deal with an ounce of fluid.

Incidentally the bitter taste tends to disappear more and more with daily custom.

4. There is abroad these days an idea that quinine has a poisonous effect on the system—the symptoms of such poisoning are:—trembling of the fingers, and a dull hunger pain and apparently some lack of mental acuity.

Now these symptoms usually appear one to two hours after taking the tabloid and it seems as if this were due to the quinine being absorbed by the duodenum instead of the stomach.

The same type of condition is also due to a small malarial infection which is not destroyed by the daily five grains.

Thus, to get the best of quinine prophylaxis, the following suggestions appear reasonable:—

(1) Quinine must vary with body weight, conditions of life and the weather.

(2) Liquid quinine should be used: the ordinary tabloid may, of course, be dissolved in water.

(3) It should be taken on an empty stomach before breakfast.

(4) If one feels out of sorts, the quinine should not be blamed, but the result of a blood examination obtained first.

If no parasites are observed, polychromatocytes may be and usually are seen. In such cases the presence of these indicates a possible malaria infection. More information on this idea will be found in my pamphlet on Blackwater Fever.

Of the natives	441	showed subtertian rings.	1,346.
	3	showed Tertian.	
	1	showed Quartan.	
	901	were negative.	

In very few cases was the patient actually admitted for malaria. In most, the parasite was present without causing symptoms. Frequently the parasite became evident in the blood as the result of the debilitating action of the initial illness.

As over 50% apparently harbour parasites, the anopheles mosquito has plenty of opportunity of becoming infected and the careless European of being infected in his turn.

Blackwater fever slides have been examined from time to time but mention of this will be made later.

Four cases of crescents were observed—one European and three Natives.

In the European case there was a curious rhythmic appearance of the crescents:—

8 a.m.	Crescents.	
10 a.m.	do.	
noon	do.	or nil.
4 p.m.	do.	
8 p.m.	do.	

He also had, of course, a severe subtertian infection.

This rhythmic rise and fall of crescents may have been merely peculiar to this patient or accidental to his case, but when one considers the sheathed microfilaria with no capability of movement themselves and their relation to the mosquito, one wonders whether this also happens in the case of the crescent to some extent.

On one occasion the subtertian parasite was grown for one generation by Bass's method.

FÆCAL EXAMINATIONS.

The total number examined was 779.

There is no need to go into detail regarding the usual parasites of the native. Suffice it to say that Ascaris lumbricoides—Ankylostomum duodenale—Trichuris trichiura—Taenia saginata—Strongyloides larvae —Cercomonas—Trichomonas, Chilomastix mesnili—Giardia intestinalis—Bilharzia haematobium or mansoni have all been found at different times in varying proportions. Ascaris lumbricoides is undoubtedly the commonest of them all and most certainly has a distinct detrimental effect on health.

But there is need to say something on the subject of Dysentery.

Of the 779 stools investigated, 216 were from Europeans.

These were divided as follows :—

(*a*) Typical Amoebic Dysentery showing E. histolytica	64
(*b*) Specimens showing epithelial debris, blood, mucus	40
(*c*) Negative	112
Total	216

Of what nature are the forty cases ?

There seems every reason for regarding them either as :—

(1) A stage in an acute attack not seen when vegetative amoebae were to be found easily.

or (2) The late after effects of an acute attack, the amoebae having been killed off by emetine.

Macroscopically and microscopically the specimen indicates a protozoal origin rather than bacillary.

On no occasion has any Bacillus belonging to the Dysenteric group been isolated, and the attempts made have been numerous.

The history given always reveals the fact of a previous definite acute attack of Amoebic Dysentery.

Post-mortem examination (in the case of natives) often reveals a gut showing semi-healed typical amoebic ulcers—yet no amoebae can be found and certainly no organism of the Dysenteric group.

Most of the cases above indicated usually clear up with Bismuth.

It would appear that patients suffering from Amoebic Dysentery may at some later date show symptoms of an Amoebic Colitis following the elimination of the amoebae, and this seems reasonable when one remembers that even an acute Amoebic Dysentery is essentially chronic in nature.

It also seems probable that several cases of apparent post-amoebic colitis are really malarial in origin and that quinine cures where emetin is of no avail.

Of the 563 natives examined, 108 were positive for E. histolytica or its cysts—sixteen showed mucus—epithelial debris, etc.

Since one was actually on the spot there has been completely eliminated any chance of the Dysentery bacillus dying out before possible inoculation on plates.

One European lady passed the larvae of the ordinary blow fly on several successive occasions. The larvae were hatched out in the Laboratory.

SPUTUM.

Total examined	158.	
Positive for T.B.	Europeans 2.	Natives 34.

Tubercle bacilli were also found in a pleural effusion on one occasion.

Different types of spirochaetes have been found on several occasions, but none seem to have been the pathogenic cause of the condition treated.

Chronic tuberculosis as seen in the European hardly exists in the Native as yet, the cases being clinically of an acute, often very acute, type and the sputum being crowded with T.B.

VENEREAL.

Wasserman Reactions	Negative 35. Positive 22 and 6 Lepers.
Cerebro-spinal fluid	Negative 2.
Sachs Georgi reaction	Negative 28 C.S. Fluid 1. Positive 13 and 6 Lepers.

In many cases both reactions were done on the same serum and with two exceptions the results were in accord.

But there have been occasions when it has been very difficult to decide whether the Sachs Georgi reaction was positive or negative.

The precise method of Dreyer and Ward has not yet been attempted owing to lack of the necessary equipment.

Chancre smears showed spirochaeta pallida in four—none in eight.

Forty-six smears from discharges showed the gonococcus in forty-four—two being vaginal smears from children of ten and twelve years respectively.

Forty of the positive gonorrhoeal smears were from Europeans.

The native gonorrhoeal discharges were not examined except in legal cases.

WIDAL REACTIONS.

Negative	8
Positive	4 1 Typhoid—3 Para B.

One para B was in a lady who had been residing in Northern Nigeria.

MISCELLANEOUS.

Under this heading the following have been done :—

Vaccines..............13. 12 for Staphyloccal Boils, 1 for B. Coli infection. Numerous blood counts—total reds, whites and differential as required. Leprosy smears.

Urines—when required for microscopic details, sugar estimations, etc.

Total 226.

Numerous blood and gland smears were examined to corroborate Dr. Orpen's examination of the Eket people.

No trypanosomes were found.

SECTION CUTTING.

The number of specimens sectioned numbered ninety-five.

They showed the following results :—

Tumours :—Fibromas four, Fibro-lipoma one, Melanotic sarcorma eye one, Glioma eye two, Glio-sarcoma eye one, Sarcoma (round celled three, mixed celled one), Simple papilloma foot one, Squamous celled epithelioma scrotum one, Carcinoma liver one, Malignant Adenoma—ampulla of Vater one, of lung one, Teratoma of female genital organs one, Gummata—liver, etc. six, Skin tumour—filaria volvolus one.

Several livers showed cloudy swelling, fatty degenerations, or cirrhotic conditions.

Liver......four examined for T. pallida......negative.

Lung......Tubercular conditions three—Pneumonic two.

Gall Bladder......Fibrosis with increase of the mucous glands.

Madura foot showed Discomyces madurae.

Glands six showed only inflammatory changes.

Four Aortic atheroma, two Aortic aneurisms and two Aortic ulcers were examined for T. pallida but none were found.

One Tubercular meningitis.

Various organs from an Owerri child showed all the signs of Malaria or early Blackwater fever.

A case of septicaemia was shown to be the result of staphylococcal endocarditis or *vice versa*.

Spinal cord and brain of a cat and dog showed no Negri bodies.

Rabbits injected with the glycerinated material showed no ill-effects.

A dog showed a typical hæmorrhagic pancreatitis.

Organs of a case of Yellow Fever showed the appearances that were much akin to Weil's disease.

POST-MORTEM EXAMINATIONS

Number of examinations	108
Drowning	8
Pneumonia.........lobar and ensuing results—heart failure or licaemia...	32
Accidents—Gun shot wounds	5
One case was due to one pellet penetrating liver and internal hæmorrhage occurring. One due to resultant gangrene of leg and septicaemia. The other three were due to perforation of gut and peritonitis.	
Railway and Motor car accidents	6
Myocarditis—result of prolonged anæmia due to Helminthic parasites and malaria	2
Chronic Amœbic Dysentery—exhaustion	3
Amœbic Dysentery—perforation	1
Acute Dysentery and leptomeningitis	1
Brain abscess—frontal—sterile—had severe dysentery—no amœbæ found in abscess	1
Cerebral tumour—apoplectic cyst	1

Growths causing exhaustion	2
(round celled sarcoma, pelvis one, and large mixed celled sarcoma infiltrating the base of an old gastric ulcer with metastases in the spleen and prevertebral glands one.	
Chronic intussusception (result of Dysentery)	1
Cerebral malaria—European	1
Enlarged prostate and pyelonephritis	1
Carcinoma (adenoma) of ampulla of Vater—European	1
Fracture of base of skull and laceration of brain tissue due to a tree falling on head	1
Infraction of left lung—European	1
Generalised Tuberculosis	21
Syphilis—Gummata of liver	4
Do. of brain	1
Perforation of ulcer of descending aorta	1
Myocarditis	6
Softening of brain	2
Generalised	2
Aneurism—arch of aorta	2
Cardiac failure—Bronchitis and Emphysema	2
Nephritis—Parenchymatous (? Syphilitic origin)	2
Endocarditis—septic	2
Debility and old age	3
Septicæmia	2
(One result of sepsis mouth, one of sepsis hip joint).	
Tetanus	2

Some of the examinations were of considerable interest, *e.g.*

1. In one of the liver gumma cases, the gumma had softened and burst into the portal vein and thence into the mesenteric veins, causing commencing gangrene of the gut.

2. A youth of fourteen to sixteen moribund on admission, died next day. The post-mortem showed what might be described as the condition of typical Yellow Fever, including the black fly speck vomit. However, he had mentioned pain in right hip. There was very little noticeable swelling and the leg showed just a slight degree of wasting. Pus was found in the joint. From it and from the kidneys and spleen pure cultures of Staphylococcus aureus were grown. This points out how careful one must be about diagnosing a supposed case of Yellow Fever which has been brought in dead.

3. Patient—man—unconscious six days.

Paralysis right 3rd nerve, right hemiplegia Paralysis of right leg began to clear up—then death.

Brain markedly congested, no actual lesion seen. The body of the Sphenoid bone was completely dead. Thrombosis of lateral and cavernous sinuses.

Heart showed advanced myocarditis and adherent pericardium.

Nothing was found in the blood, fæces or urine.

No signs of Syphilis. Wass; negative blood and C.S. fluid.

4. Two livers showed the nymphal stage of Porocephalus armillatus—two specimens were also received from Dr. Forde at Enugu.

5. Large mass in left pelvis—fingers of growth proceeded in all directions enclosing iliac vessels, compressed neck of bladder, nerves and veins. (Much neuralgia).

Iliac fossa eroded and the cartilage also in sacro-iliac joint. Bone was thin and easily broken.

Nearly complete back pressure on heart and subsequent cardiac failure.

Growth weighed 3½ lb. and was a small, round-celled sarcoma.

6. A drowned woman gave birth forty-eight hours after death to a child. This was due to gaseous distension of the abdomen. There was complete extro-version of uterus.

Two cases of Yellow Fever were investigated at Warri. The report is attached.

Harper's new intravenous method of treating Lepers was carried out at the Yaba Leper Asylum. Report is attached.

PUBLICATIONS.

(*a*) A case of Acute hæmorrhagic pancreatitis in a dog. (Journal of Tropical Medicine and Hygiene, November 15th, 1922).

(*b*) "A theoretical suggestion as to the cause of Blackwater Fever. Some notes on treatment and prophylaxis."

This awaits publication in the same Journal. In pamphlet form it has been issued to all Medical Officers in Nigeria by the Director of Medical and Sanitary Service—Dr. Rice, C.M.G.

The conclusions reached are given here.

1. In West Africa, no authentic case of Blackwater Fever ever occurs or occurred without a previous history of Malaria.

2. If a sufficient number of films are examined in such cases, malarial parasites can be found in more than half the cases before and after the attacks.

3. The post-mortem findings are similar to those of malaria with the added symptom of hæmoglobinuria and its results.

4. The presence of polychromatocytes is of great diagnostic value as to the presence of obscure malaria.

5. "Blackwater Fever" is not a disease *per se* but only a complication of a severe infection of malaria. This complication which might occur and sometimes does if the patient can survive otherwise, is made premature by the exhibition of a certain dose of quinine usually larger than the patient is accustomed to take. Its action on the large number of the severely poisoned cells accounts for the explosive character of Blackwater Fever. It should be called "Malarial Hæmoglobinuria."

6. To prevent malaria, prophylactic quinine must be used scientifically and not indiscriminately.

7. Any change in the environment or individual health may alter the prophylactic dose required.

8. Quinine is the only remedy for subtertian malaria at present of any value.

9. So-called "Blackwater Fever" is a blot on the intelligence of the community and should never be seen under normal peace conditions.

10. Any factor *which impairs the body's efficiency* may turn a not too severe attack of malaria into one of malarial hæmoglobinuria.

REPORT ON THE LEPERS AT YABA ASYLUM AFTER SIX MONTHS' TREATMENT BY THE METHOD SUGGESTED BY HARPER.

This report is divided into four parts and conclusion.

Part I gives a brief description of the hospital and surroundings and mode of life of the lepers.

Part II deals with previous treatments given.

Part III describes the lepers' conditions on March 31st.

Part IV—their state of health on September 30th, and particulars of the methods of treatment adopted.

PART I.

The leper asylum is situated on the same piece of Government land as the Medical Research Institute, about 5½ miles north of Lagos.

The leper hospital occupies about 15 acres of land.

There are many excellent shade trees and numerous orange and lime trees. The whole is surrounded by a wire fence six feet high.

At the entrance, which is on a side road which leads to many villages in the bush, is a small receiving bush house. Here any treatment required is given.

About 150 feet back are four blocks of stone and thatch houses, two in the male compound and two in the female compound. The blocks are parallel to each other and each contains six compartments which have a door at each side so that a through and through ventilation can be obtained. The floors are of mud, well raised. Between the two sets of blocks are the caretaker's and dispenser's houses.

On one side is a large piece of fertile ground where crops can be grown. On the other is a galvanised iron compound with shelters inside for leper prisoners.

The patients are allowed to do as they please. If they wish to work they do so. Some till the land, others attempt small chicken and hen farms.

They enjoy picture papers—although all are illiterate, except one who, unfortunately, is blind.

Considering their wretched condition, they are wonderfully cheerful and full of fun, and take tremendous interest in leper therapy.

At present there are eleven males and three females. One female is completely mad and the other two are slightly mentally affected.

In the good weather they usually spend most of their time under shade trees, talking and sleeping and exchanging conversation with those passing by to their villages.

They are amply supplied with food and are given a tobacco allowance; and although being far from strictly guarded (except the prisoners) show no desire to run away, which means that as far as is possible for them, they are fairly well satisfied.

They are exceedingly grateful for any kindness shown.

PART II.

In the annual reports of the Medical Research Institute for the past seven years, some details of certain cases and of the treatments adopted are given.

The late Dr. Coghill did much useful work amongst them and since his death, Dr. Connal has also tried the effect of many different remedies. To give some idea of some of the remedies tried, I quote from a letter of Dr. Connal dated 30.3.22.

> "Para. 4————Indeed I am of the opinion that Oscol Stibium, other Antimony preparations and the crude Chaulmoogra oil are greatly inferior (to Moogrol) and I speak from long experience of these, as also of the Gynocardates, Nastin, "Resorcin, Camphorated Oil and Chaulmoogra," Potassium Cupro-Cyanide, Atoxyl.

All these preparations were given intramuscularly, and, causing considerable pain, were anything but popular with the lepers. In many cases large brawny swellings ensued which took weeks to disappear. The only substance which showed a definite tendency to improve the condition was the Crude Chaulmoogra Oil.

When Moogrol was put on the market, Dr. Connal started intramuscular injections at once with it and noticed much improvement within quite a short period.

PART III.

On March 31st, all the male lepers were examined for the presence of Lepra Bacilli and all were positive. Raw crusts could be seen or felt in all their noses. All except two (one a tubercular type, the other an early anaesthetic case) had open sores—some being very foul. One was blind, others had fingers and toes lacking. Some had severe leprotic fever, and all their ulnar nerves were markedly thickened. In other words, all except the early anaesthetic case, were well advanced cases of leprosy.

PART IV.

When asked if they cared to have a new type of treatment, they did not respond too enthusiastically, as even Moogrol intramuscular injections had become a somewhat painful method.

However, after a little persuasion, four volunteered to try Harper's Intravenous method. They were accordingly given ten minims intravenously of Moogrol 500, Ether 500, and Iodine one.

In a week the others came to realise that the treatment was easily the best they had yet had tried upon them and all except three became intravenous patients.

Before the injection was finished, and certainly immediately afterwards, strong coughing ensued, but soon passed off. Next morning the face was somewhat bloated.

Leprous tubercles were swollen—the eyelids heavy and puffy. Occasionally, fever followed the injection, a leucocytosis was the rule up to twelve to fifteen thousands—but all expressed themselves as feeling "better for themselves."

Unfortunately, however, the number of veins that could be punctured was very limited in some cases.

In one case for example, the only veins that could be got at any time were a dorsal one on the hand and about two inches of the Median Cephalic vein of the same arm. The others were either not visible or not palpable or fibrous. So one can understand that under such conditions a daily intravenous injection in such a circumscribed area began to get painful. At the end of three months they began to tire of this method. They admitted how good it was, but the injections were getting too painful.

Thinking perhaps the fibrous condition of the veins was due to Syphilis, I did a Wassermann reaction on six—only two were positives. These I treated with Novarsenobillon and the veins of one greatly improved.

At this stage the intravenous injections amounted to 12 minims of Moogrol.

In the fourth month they all asked for the muscular injections except one, but curiously enough the intramuscular injections seemed to disturb them more without creating marked improvement at the time. In two cases this was very marked and after four injections of 5–8 cc. Moogrol they became quite ill—this being obviously the resulting reaction. These four were left alone then.

Gradually, the reaction quietened down and slowly they improved. The final stage is undoubtedly better than the first but the experience for them has been both painful and uncomfortable.

Finally, the intramuscular injections were not so appreciated so I made up a mixture of Moogrol, Iodine to give a distinct brown colour—Chalk and water sufficient to make an emulsion and prevent any diarrhœa. This became very popular and the lepers were allowed to please themselves when and how much (up to ten drachms) they took. The result was, if they reacted they had a day or two's rest, if not they carried on with the treatment.

Three lepers showed great improvement.

The early anæsthetic case however is as before.

I hope to get them started to the intravenous method again shortly, however.

Their state at present is :—

(1) All have lepra bacilli in their noses.
(2) Ulcers healing—or healed.
(4) A distinct feeling of well-being both physical and mental.

CONCLUSION.

Harper's methods of intravenous injection is decidedly of great value, and its value is enhanced if one need not puncture the same vein in the same place more than once a month.

The intramuscular method is useful and efficacious, but is decidedly painful and does not encourage a leper to seek treatment voluntarily.

Treatment by the mouth also appears to be useful and is certainly painless and incidentally completely natural.

It would appear that to obtain a not too violent reaction is the thing to aim at. When the reaction appears, then stop all treatment till the patient feels ready for more.

Whether this treatment can actually cure I dare not say, but it certainly makes life worth living to the leper and cures his sores and apparently arrests the disease's progress. This evidently happens naturally.

One old man has been in the hospital 23 years and has had the disease for 37 years. Except for the loss of some toes and a finger or two, he appears fit although he has an active ulcer.

Apparently he produces enough anti-bodies just to keep the disease in check. He has always refused treatment and I think he is very wise. In leprosy, there is also wisdom in leaving well alone.

The results are encouraging, but six months is far too short a period in which to be able to make any statement of any value.

But like Tuberculosis, cheerful surroundings, plenty of nourishing food, sun baths and fresh air greatly aid any medical treatment which is being attempted.

P.S./

Since writing the above recent literature has come to hand, the tone of which indicates also that Dr. Harper is somewhat optimistic. In the original report many photographs showing stages of treatment were added.

REPORT ON YELLOW FEVER OUTBREAK AT WARRI DURING OCTOBER AND NOVEMBER, 1922.

On the D.M. and S.S. 's instructions I left for Warri per S.S. *Thomas Holt* on November 15th, and arrived November 16th, afternoon.

The first case, the Italian, had been buried on the Monday, November 15th. I make no comments on that case as Dr. Leonard is reporting it in full. The post–mortem findings will be given later, however.

In the native ward there was a native constable detained because of Jaundice. I have seen Yellow fever in Europeans but never definitely to my knowledge, in a native, and I was immediately struck by two peculiar features in this case.

1. The light yellow–green Jaundice (not the usual dark ochre colour as in ordinary jaundice).
2. The intense keen interest the patient took in everything that was happening in the ward. No movement seemed to escape him.

His temperature was round about 100°F.; his pulse was corresponding and soft. Examination of his urine showed a slight cloud of albumen, bile and short epithelial and granular bile—stained casts as seen in European cases.

This was the fourth day of the disease. Two c.c. of his blood in saline was injected into a guinea pig, but, as was to be expected, with no after results.

On the fifth day temperature fell slowly and on the sixth it was normal and the patient felt well and hungry, but that morning he passed a tarry stool which satisfied the necessary tests for occult blood—Ascaris and Ankylostome ova were also present.

Towards five o'clock he commenced vomiting large quantities of black vomit and passed other tarry motions. The temperature rose and by six o'clock it was 101° F. He looked ill and anxious and smelled to me of a badly kept slaughter house.

At 8 p.m. he was much worse, had vomited more black vomit, his temperature was 102° F., and his pulse was not in proportion to the temperature. One cannot prophesy but he gave me the inpression of a fatal issue. I now felt entirely satisfied as to the diagnosis and gave him 20 c.c. of Noguchi's serum intravenously. At 10 p.m. the temperature had dropped two degrees—he felt comfortable—no more vomiting—the epigastric pain had eased and the "gun–washing" smell had gone—pulse soft and full. He felt better and said he would sleep, and he did. He made an uninterrupted recovery, the temperature being normal and remaining so next day. No more tarry motions appeared.

Several Europeans were brought into hospital about this time with temperatures, but none showed any sign whatever of Yellow Fever and were either Malarial cases or others as easily diagnosed.

I went over carefully the native town—Alderstown—where the Italian lived, but whether as the result of the general cleaning up or not, I cannot say, but I failed entirely to find Stegomyia fasciata.

At the Bank (B.B.W.A), I found Stegomyia in abundance but they were not fasciata (or calopus). In fact, although there were numbers of tree mosquitoes, the domestic and disease bearing mosquito was very scanty.

From the accounts given of the Italian's movements prior to his illness, I am led to conclude that he contracted his illness *not in Warri* but in some outlying native village of which there are plenty in the mangrove swamps. He had a habit of visiting such places in the dark and late night, and in early morning I believe. In fact, the native opinion was that he had been poisoned.

All the white population who desired it were vaccinated with Noguchi's vaccine. Beyond slight muscular stiffness there is nothing special to record about the vaccinations.

Warri is very moist and is somewhat overcrowded with trees which certainly keep the breeze off which blows from the creek. I would recommend that every second tree all over Warri be removed. This would allow the other trees to grow bigger and higher and so allow of more ventilation beneath them.

I came back through Sapele, Benin, and Oshogbo. I saw no signs of Yellow Fever in any of these places, nor rumours to that effect.

The microscopic findings of the post-mortem specimens of the Italian are appended. They were typical of Yellow Fever, except in the case of the liver, which fitted more the description of Weil's disease. No Spirochaetes were found in the silver-stained preparations.

An attempt was made to examine the local rats for L. icterohaemorrhagiae, but none were caught. Dark ground examinations of suspicious bloods failed to reveal L. icteroides.

I must put on record the great kindness I had from everyone—especially must mention Dr. and Mrs. Leonard—the Sisters, Misses Smith and Murphy, and the Resident, Major Swanston—but all were kind and helpful.

Nearly every Medical Officer has sent material during the year. They are cordially thanked for doing so.

MICROSCOPIC RESULTS.

LIVER.

Shows granular degeneration of cells. Nuclei stain well.

Some Lymphocytic and polymorphonuclear infiltration. No marked fatty degeneration nor zonal destruction. In fact it fits the description given by Professor Hoffman in his article on Leptospira experimental infection of guinea pigs—*see* Journal of Tropical Medicine and Hygiene, page 353, of November 15th, 1922. This fits the pathological findings of Weil's disease.

PANCREAS.

Appears to me as described on page 355.

KIDNEY.

As on page 354 and so forth.

In fact the histological results would apply rather more to Weil's disease than Yellow Fever.

No spirochaetes found in the silver-stained preparations.

(Sgd) W. A. YOUNG,

Assistant Bacteriologist.

Lagos,

4th January, 1923.